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acteristics in facial and cranial anatomy. It was clearly his intention to present this from a much wider comparative scheme had his life been spared.

He almost incidentally refers to a subject which interested him deeply and on which he would have made more extended examinations; that is, as above mentioned, the mental capacity of the individual as a distinct cause of modified skull form. While this in itself is not new, he aimed to approach it by novel tests.

The last lines of that memoir are indicative of his loftier estimate of craniology than a mere criterion of race. As such, he did not esteem it highly; but he saw in the investigation of the nutritive, psychical, cultural and morbid processes which alter the cranial contours, admirable illustrations of those profound forces which shape and mould life forms everywhere, and are the underlying momenta of all morphology, whether of plants or animals. In this comprehensive sense, craniology takes just rank among the great and leading subjects of scientific investigation.

Another feature in the memoir which will attract the student is a novel graphic method of displaying similarities and differences of skull form. Dr. Allen called it the "terrace method," and it has obvious advantages over the curvilinear graphic systems now in use.

This brief review of Dr. Allen's labors in one branch of learning would be still more imperfect did I neglect to record some of his personal characteristics as a student and teacher of science. Everywhere his work was marked by a singular modesty of claim, by entire justice to the labors of others in the same field, by gentleness in criticising their results, by constant willingness to assist those who sought information, by an earnest desire to stimulate the love of knowledge for its own sake, and by unceasing efforts to present this knowledge in its broadest relations both to human welfare and abstract science.

DR. HORN'S CONTRIBUTIONS TO COLEOPTEROLOGY.

BY JOHN B. SMITH.

When it is said that poets are born, not made, it is putting in a loose and popular form the fact that men are unequally endowed at birth; that special faculties are inborn in some who, if they are

given the opportunity to use them, become eminent in literature, art or science.

It is certain that Dr. George H. Horn was a born systematist:—a man with a genius for arranging things, for ferreting out their true relationships, for ascertaining the meaning of apparently meaningless structures, and for uniting everything into a consistent, congruent whole.

It is probable that, whatever the line of natural science taken up it would have profited by Dr. Horn's work. It is certain that the study of Coleoptera has been enormously advanced by him, and that not only were new facts added, but old, well known matter became endowed with new life and meaning under his masterly treatment.

He exhibited an interesting combination of the almost intuitive ability to reach sound conclusions characteristic of certain brilliant Frenchmen, with the power to give close attention to detail and to painfully strive after facts peculiar to many German students. It is this ability to do patient work in securing facts, and to marshal them in such order that they led irresistibly to the conclusion which he had reached, that gives his work its permanent scientific value.

It is difficult to speak of Dr. Horn without referring also to Dr. John L. Leconte:—first and always his teacher, afterward also his co-laborer. And it was wonderful how these two men supplemented each other! Dr. Leconte was the broader student of nature; his grasp was wider and he saw the Coleoptera more truly in their relation to other orders, and the insects in their relation to the rest of the animal kingdom. Dr. Horn was narrower, but his knowledge of detail was greater and more accurate. The result of combining these two characteristics may be seen in the *Classification* of the North American Coleoptera, a work, the like of which does not exist in any other country or in any other language. There are more elaborate books, profusely illustrated, much more expensive and equally valuable as contributions to entomological science; but nowhere is there so much, so clearly and succinctly told in so small a compass. There is scarcely a useless word in the book, yet all that is needful to inform the student is there. It represents the ripe experience of Dr. Leconte and the critical and accurate knowledge of technical detail characteristic of Dr. Horn.

It is difficult to estimate rightly Dr. Horn's influence on Coleopterology at the present time. There is no doubt that for America

he fixed a standard below which no future worker may fall if he desires to obtain recognition, or to be considered other than an amateur. In other countries his methods and conclusions were at first opposed, then tolerated, and now some of the younger workers are beginning to follow him. In the United States almost all recent work has been on the models furnished by him. There is only one notable exception. His influence appears strongly in almost every paper on Coleoptera that has been published in the United States during the last decade, and no doubt so long as these writers continue, this influence will be felt. He has set the example of thoroughness, and nothing else will be acceptable in the future. He has constantly taught us that individuals are parts of an aggregate species, and that species are not isolated facts or productions but parts of a great scheme which it is the work of the systematist to unravel. This is the impression gained from his work and such were his verbal statements at society and other meetings. The influence of this teaching will be felt throughout at least the present generation. In breaking away from the older schemes of classification and seeking characters, not only in one organ or any one set of organs or appendages, but everywhere on the body; in proving that nothing is too insignificant to be studied and to have a meaning, he has rendered a service, not only to Coleopterology, but to entomology at large, which will not be estimated at its true worth for some time to come.

He early impressed upon me, the important fact that the only true way to do systematic work is to ascertain how the species under consideration had developed, and this perhaps is the true secret of his success in untangling many of the problems in the classification of the Coleoptera. The certainty with which he seized upon the important characters, though sometimes almost the most inconspicuous as well, seemed often little short of marvellous, and when once he had the clue, the persistence with which he followed it and the skill with which he showed how what was, had come to be, challenged the admiration of all who used the published results of his labors.

The strength of his faith in the correctness of his system is shown by the fact that several times when he found what he considered unwarranted breaks, he predicted the discovery of other species with a stated combination of characters; and these species have been in most cases, actually discovered. It is not the least of Dr. Horn's services to Coleopterology that he has set so clear an example as to

induce other workers in other departments of entomology to accept his methods so generally.

To be recognized, a species must be described and named, and in entomology, especially, there is a great field for one afflicted by the *mihi* itch. But while, by force of circumstances, Dr. Horn was occasionally compelled to describe species singly, yet this was always a disagreeable task, the greatest number of the species named by him, and these run well over a thousand, being described in monographic or systematic papers and their relationship to those already named, properly brought out. He always claimed that there was no evidence that an insect was really suffering for the want of a name, and that no wrong would be done to it by postponing the christening for a brief period.

To him a species was not of interest in itself, or merely as a new thing that was to be named. It was of the greatest interest only when it filled a gap in a series. Species to him were steps, halting places in the march toward a specific structure or combination of structures, and he was always delighted when a particularly long stretch of territory was broken by a new discovery.

The result of this mode of looking at species is seen in his arrangement of tables and synopses; always the effort is to express the structural relations of the forms to each other, and the various lines that diverge from each obvious type. It is also shown in his description of species, which are models of clear statement in which essentials are emphasized, structure is given the foremost rank, and minor details are often mentioned only as a mere incident. The important point to him was the combination of characters; the individual was useful only as an evidence that such a combination actually existed.

In this matter of specific descriptions I may be allowed to quote the opinion of Mr. Henry Ulke of Washington, D. C., the oldest of the American entomologists to-day, the companion and friend of Dr. Leconte almost from the beginning of his work, and equally the friend and fellow-worker of Dr. Horn. He says "Up to this time it was necessary for all entomologists, even Horn, to consult the types before beginning any monographic work, to ascertain what the describer meant, and to visit Cambridge, London, Paris, or other places for that purpose. With Horn this is not necessary. His descriptions are so ideally accurate that one is never in doubt as to which species is under examination. His lucidity and clearness often remind me of a well executed portrait where the resemblance to the original is so striking as to be recognized at the first glance."

He never described an individual as a specific representative. He insisted that a species could never be represented by one individual, or even by one sex only. The characters of both male and female combined were necessary to make it intelligible, and the true idea of a species comprises also all of its variations in both sexes. Almost as a logical necessity he did not believe in types, and I do not think that there is a single specimen in his entire collection so labelled. In his view every specimen in his hands, when he described a species, was equally a type, and the only concession he would make toward the single example idea was to place one specimen on the label.

This is a point on which opinions vary. I am not sure that I would like to go quite so far as he in this particular. I believe that the Doctor was perfectly correct in his idea of a species. It seems to me, indeed, the only logical conception; but I am not certain that it was good policy to neglect the designation of an individual as representing the described combination. No man is infallible, and even Dr. Horn may have confused two species under one name, and the designation of an individual type would possibly save trouble afterward in selecting the particular form which should stand for the name proposed by him.

Dr. Horn was a hard worker in every sense of the word. His temperament was such that he was never really happy unless at work, and a fair day's scientific labor was always accomplished, even when the demands of his profession kept him up for almost entire nights. It needs only a reference to the publications of the American Entomological Society to get some idea of the amount of work that was accomplished, and as to its quality, the standard remains the same up to the very last paper published by him.

His work began with *Descriptions of three new species of Gorgonidæ in the Collection of the Academy*, published in the *Proceedings* for 1860, p. 233, or thirty-seven years ago.

His first entomological paper: *Descriptions of new North American Coleoptera in the Cabinet of the Entomological Society of Philadelphia*, was published in the same volume, pp. 569-571, with Plate 8.

The list of his papers comprises 240 titles, only six of them non-entomological, and in them about 150 new genera and more than 1,550 new species were characterized. The papers are not widely scattered: the *Proceedings* of this Academy, of the American Philoso-

phical Society and the *Transactions* of the American Entomological Society contain by far the greatest proportion and all the most important of them.

Yet a mere enumeration of the number of titles and of the number of genera and species described does not give an adequate idea of Dr. Horn's contribution to the literature of American Coleopterology. He never wrote merely to fill space and few of his titles represent short notes. Almost all represent the results of original study and many titles cover considerably over 100 pages of print. This print itself is usually condensed and so is the language of the author. Dr. Horn possessed in an unusual degree the power of succinct statement and he never wasted words. It was his practice to formulate his conclusions in the briefest possible manner and to present his proofs simply and without argument.

Though but 150 genera are credited to him, yet of the almost 1,900 accredited to our fauna he has studied nearly all and has actually characterized for the *Classification* by far the greatest number of them.

While the species described by him number but 1,550 yet in describing these he made known to us more clearly than they were known before, more than half of the 11,000 described North American Coleoptera. The work he did was simply stupendous and it grows on one as he considers it. Everywhere order appears out of chaos; under his touch what we had considered a hopeless tangle is now found to unravel easily, and we are surprised at the wealth of good characters in series which had theretofore been so distressingly similar in appearance that nothing could be done with them.

Where so much is excellent it is difficult to assign comparative rank to the published work; but perhaps that on the genera of Carabidæ, 1881, may be considered the best. It was certainly in some respects the most thorough, the most revolutionary and the most convincing; for his conclusions have secured practically universal acceptance. His work on the Silphidæ in 1880 while not so brilliant, was even a greater tax on his powers, and I am not certain that he did not himself feel most proud of this.

It would be a serious omission did I fail to call attention to the fact that many of Dr. Horn's papers are fully and carefully illustrated with drawings from his own pen and pencil. That same faculty that enabled him to seize the important structural facts in an insect seemed to animate his pencil when he sketched them for the

information of others. His drawings could scarcely be called artistic, and were often the merest outlines; but somehow they seemed to show just what it was intended they should, and if not pleasing to the eye, they were decidedly instructive to the mind.

Mr. Samuel Henshaw of the Boston Society of Natural History has well expressed a general estimate as follows: "I doubt"—he writes—"if there is an entomologist with the same work to his credit, the same in amount and kind, who has left so little to be set aside or corrected, as will be found to be the case with the work of Dr. Horn."

Dr. Horn was what may be called a "closet naturalist," although with considerable experience in the field. His work was with dead and dry specimens and, while always interested in life histories or what are now termed biologies of insects, these were secondary. The specimens and the facts they represented were the things, always.

I do not believe he ever cut a section of an insect in his life and certainly never made use of any in his work. He would, therefore, be condemned as unscientific by those who see no value in work not biographic and those who consider that no sound conclusions can be reached unless a specimen has been elaborately prepared, sliced, stained, mounted and then ideally reconstructed. Yet all these are equally studies of nature and each may be scientific or the reverse. We need all the facts from every point of view and to consider one line of work superior or more essential argues the narrowness of the specialist who sees nothing good except as the result of the method followed by himself. Even the "mere species maker" whom it is at present the fashion to heap with contumely has a right to exist, for without him we could not refer intelligently to the creature whose life history is under consideration or whose parafined corpse is undergoing "microtomy."

Dr. Horn has shown us by his labors that nature and the manner of nature's work can be as intelligently studied in preserved adult specimens as in any other stage or manner; and if his work is as well done as I believe it has been, the work of students following other paths will simply confirm his conclusions.

The aim of the scientific student should be to get at the truth, and all methods of reaching that goal are worthy of consideration. This was the conviction of Dr. Horn himself, and I believe he was right. At all events the contributions made by him to Coleopterology give him an indisputable right to rank with the best that are or ever have been workers in this Order.